

BELLCOMM. INC.

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SUBJECT: Voice Communications Monitoring
During Apollo 14 Flight Readiness
Test - Case 320

DATE: December 29, 1970

FROM: L. A. Ferrara

ABSTRACT

Selected voice communications facilities supporting the Apollo 14 Flight Readiness Test were monitored at KSC during the latter parts of the test on December 17-19, 1970. The communications network adequately supported the test even though some procedural and equipment problems were evident.

The problem areas noted include: (1) noise on OIS Channels 212 and 214, (2) distorted VHF downlink voice from the spacecraft, (3) low level transmissions from Houston Flight, and (4) command data circuit failure between MCC and GMIL during the terminal count.

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MONITORING DURING APOLLO 14 FLIGHT READINESS
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MEMORANDUM FOR FILE

Voice communications were monitored at KSC during the Apollo 14 Flight Readiness Test on December 17-19, 1970. Although the simulated liftoff was delayed and rescheduled twice due to flight computer problems in the Instrument Unit, the voice communication facilities supported the test adequately. The author monitored from facilities in the back-up Firing Room at LCC 39. Mr. J. T. Raleigh was stationed in the NR Communications Laboratory (MOLC) in the MSOB which permitted monitoring the spacecraft/ground station interface.

Both procedural and equipment problems related to the voice communications system were observed. They are similar to those observed on previous Apollo missions and pre-launch tests. While these difficulties were not serious enough to delay the test, some are considered potentially hazardous. The significant communications anomalies observed were:

1. The voice transmission from the LMP position in the spacecraft included a short garbled segment on the VHF downlink as heard on Channel 214 during the latter part of the Astro Communications System validation test (0720 EST Dec. 17). It was not possible to locate the source of this problem nor to cause it to be repeated in a subsequent real time checkout of the system. Preliminary findings show that the garbled voice was present on the VHF Astro Communications circuit from GMIL to the Astro Communications (Stoney) Console in LCC 39 where it was connected to OIS Channel 214. The same voice signal which was transmitted simultaneously from the spacecraft on the S-Band downlink Astro Communications circuit was not distorted.
2. "Houston Flight" (HFLT) voice was occasionally at a low level on Channel 214 (at one time, it was reported to be 20 dB below the average level of the KSC test personnel). HFLT also had problems in establishing two way communications with KSC test personnel (1706 EST, Dec. 18) because he was initially using a "monitor only" circuit connecting him to Channel 214 which was

the prearranged configuration of the OIS Channel to MSC.¹ It was observed that MSTC frequently uses Channels 212 and 214 simultaneously and/or interchangeably for his command channel.

3. During the power-down sequence for the spacecraft, after the Test was scrubbed at about 2000 EST on December 18, the spacecraft S-Band transmitter was turned off while the output of the S-Band receiver at the GMIL station was still connected to Channel 212 and Channel 214 via the Astro Communications System and the Stoney (CSTO) Console. The resultant noise output of the GMIL receiver made these channels useless for about one minute until CSTO was able to contact the Spacecraft Communications System Engineer (MCSE) on Channel 213 and request permission to drop the connections at his panel. Although this action promptly removed the noise from the OIS channels, it is not the best procedure because it also removes S-Band and VHF uplink capability. In an effort to determine the cause of this noise, the test conductor (MSTC) called the KSC communications personnel on Channel 117 who explained that the noise was a procedural and not an equipment problem. Contrary to our previous understanding, there is apparently no operating procedure being used by which a technician at GMIL will disconnect a noisy receiver from the OIS channels. Failure to keep such noise off the voice channels will prevent key test personnel from communicating with the astronauts. This could be very critical in the event of a spacecraft emergency.

A second occurrence of short noise bursts on Channels 212 and 214 was noted at 1132 EST on December 19, (T-2^h:30^m), but the cause of the noise was not explained on the network. It was apparent to Mr. Raleigh, however, who, by observing the carrier spectrum at MOLC noted that the noise occurred because the downlink USB signal from the CSM was lost at GMIL in the process of acquiring the uplink signal. The uplink carrier from GMIL had been secured at 1036 EST because the spacecraft was considerably ahead of the Launch Vehicle count.

Channel 214 also became quite noisy during the terminal count (when LMP keys on the spacecraft VHF transmitter for carrier power and frequency measurements) because of the open microphone in the spacecraft. It should be noted that even if GMIL disconnects their VHF receiver from the Astrocomm circuit, (per sequence 08-240, TCP K0028V1) this spacecraft acoustic noise will still enter the OIS system over the S-Band and umbilical circuits.

1. Long Lines Communications Guide, Apollo 13 Air Ground Comm Annex, Manned Spacecraft, March 20, 1970.

4. The LMP position in the spacecraft was generally poor in readability as heard on Channel 214 in LCC 39. In addition, high level acoustic background noise in the spacecraft was very apparent during the first parts of the test, but it improved noticeably during the final portion of the test with the prime crew in the spacecraft.
5. The command interface circuit between MSC and GMIL suffered an outage at T-37^m. The computer was safed at GMIL which was not consistent with the launch mission rules. After some delay the KSC Abort Advisory System was configured for local command capability until the Houston circuit could be made good. This was accomplished in time for the CTE updates at T-15^m.

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